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EXAMINER	
LAI, ANDREW	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/615,649	NUCCI ET AL.	
	Examiner	Art Unit	
	Andrew Lai	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/19/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1,12,14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holender et al (US 6,069894, Holender hereinafter) in view of Bertin et al (US 5,600,638, Bertin hereinafter).

Holender discloses methods for "enhancement of network operation and performance" (col. 1 lines 1-2) comprising the following features:

Regarding Claim 1, *a method for identifying optimal mapping of logical links to the physical topology of a network* (see "a method ... for partitioning physical transmission resources among logical networks" recited col. 4 lines 53-54 and further "on top of a physical network a number of logical networks are established in which logical links, used by routes, share the same physical transmission and switching resources" recited col. 3 lines 62-65), *the method comprising:*

obtaining one or more mapping options for mapping multiple logical links (fig. 4 top block "establishing a set of logical networks on top of a physical network") *between a first pair of network nodes and a second pair of network nodes, the first and second pair of network nodes sharing at least one node* (see "The logical networks comprise

nodes and logical links extending between the nodes so as to form the logical networks. The logical links are used by routes interconnecting the nodes of node pairs in the logical network" recited col. 4 lines 13-17), *onto physical paths that are at least relatively disjoint* (see "limiting the degree of integration to only partial rather than complete sharing of physical transmission and switching resources" recited col. 5 lines 54-56);

obtaining decision variables, network parameter and requirements *between each pair of network nodes* (see "... optimized with respect to at least a set of decision variables, given physical network parameters and the requirements of each logical network" recited col. 4 lines 20-23); *and*

correlating the mapping options ("set of logical networks") *with the* network parameter and requirements *to identify optimal mapping of logical links to the physical topology of a network* (fig. 4 middle block "optimizing an objective function which is closely related to the operation of the physical network with respect to decision variables").

Regarding Claim 14, *a computer system* (fig. 1 "operating support system", OSS hereinafter) *for identifying optimal mapping of logical links to the physical topology of a network* (see "device for partitioning physical transmission resources among logical networks" recited col. 4 lines 53-54 and further "on top of a physical network a number of logical networks are established in which logical links, used by routes, share the same physical transmission and switching resources" recited col. 3 lines 62-65), *the system comprising:*

a practical constraint module comprising a mapping option sub-module (fig. 1 "control program module" in said OSS) *for obtaining one or more mapping options for multiple logical links* (fig. 4 top block "establishing a set of logical networks on top of a physical network") *between one or more pairs of network nodes* (see "The logical networks comprise nodes and logical links extending between the nodes so as to form the logical networks. The logical links are used by routes interconnecting the nodes of node pairs in the logical network" recited col. 4 lines 13-17) *onto physical paths that are at least relatively disjoint* (see "limiting the degree of integration to only partial rather than complete sharing of physical transmission and switching resources" recited col. 5 lines 54-56) *and* a control program module (fig. 1 "control programs") *for obtaining* decision variables, network parameter and requirements *between the each pair of network nodes* (see "... optimized with respect to at least a set of decision variables, given physical network parameters and the requirements of each logical network" recited col. 4 lines 20-23); *and*

a correlation module (fig. 1 "processor system") *coupled with the practical constraint module* (fig. 1 depicting the coupling of said "processor system" with said "control program module") *for correlating the mapping options* ("set of logical networks") *with the network parameter and requirements to identify optimal mapping of logical links to the physical topology of a network* (fig. 4 middle block "optimizing an objective function which is closely related to the operation of the physical network with respect to decision variables").

Regarding Claim 22, *a system* (fig. 1 "operating support system", OSS hereinafter) *for identifying optimal mapping of logical links to the physical topology of a network* (see "device for partitioning physical transmission resources among logical networks" recited col. 4 lines 53-54 and further "on top of a physical network a number of logical networks are established in which logical links, used by routes, share the same physical transmission and switching resources" recited col. 3 lines 62-65), *the system comprising:*

means (fig. 1 "control program module" in said OSS) *for obtaining one or more mapping options for mapping multiple logical links* (fig. 4 top block "establishing a set of logical networks on top of a physical network") *between one or more pairs of network nodes* (see "The logical networks comprise nodes and logical links extending between the nodes so as to form the logical networks. The logical links are used by routes interconnecting the nodes of node pairs in the logical network" recited col. 4 lines 13-17) *onto physical paths that are at least relatively disjoint* (see "limiting the degree of integration to only partial rather than complete sharing of physical transmission and switching resources" recited col. 5 lines 54-56);

means (fig. 1 "control programs") *for obtaining* decision variables, network parameter and requirements *between the each pair of network nodes* (see "... optimized with respect to at least a set of decision variables, given physical network parameters and the requirements of each logical network" recited col. 4 lines 20-23); *and*

means (fig. 1 "processor system") *for correlating the mapping options* ("set of logical networks") *with the* network parameter and requirements *to identify optimal mapping of logical links to the physical topology of a network* (fig. 4 middle block "optimizing an objective function which is closely related to the operation of the physical network with respect to decision variables").

Regarding Claim 12, *one or more computer storage media having computer-executable instructions for performing the method recited in claim 1* (fig. 1 "Operating Support System" with "Database" and "Control Programs", and see further "the method according to the first preferred embodiment of the invention is preferably performed by on or more control programs CP of the control program module of the operation and support system OSS" recited col. 14 lines 13-16)

Additionally, Holender discloses considering *delay* in the context of separating logical link optimization for different service classes (see "delay sensitive and loss sensitive service classes can possibly be managed and switched easier if the two groups are handled separately" recited col. 5 lines 60-62). However, Holender does not expressly disclose an inclusion of *maximum time delay* into his decision variables, network parameter and requirements and thus has no express teaching of the following common features to claims 1, 11 and 22:

obtain a *maximum time delay allowed* between each pair of network nodes; and correlating the mapping options with the *maximum time delay* to identify optimal mapping of logical links to the physical topology of a network.

Bertin discloses a "method and system for improving the processing time of the path selection in a high speed packet switching network" (col. 1 lines 1-4) wherein "network topology is kept current in every node through continuous updates [and] allows dynamic network reconfigurations without disrupting end users logical connections" (col. 10 lines 31-34) comprising, for **claims 1, 14** and **22**, the above said features missing from Holender:

obtain a maximum time delay allowed between each pair of network nodes (see "maximum end to end transit delay" recited col. 7 line 1, which is "less than a specified threshold" recited Abstract lines 8-9); *and correlating the mapping options with the maximum time delay to identify optimal mapping of logical links to the physical topology of a network* (see "One advantage of the path selection technique of this invention is that a maximum path length constraint can be imposed on the path selection process" recited col. 6 lines 47-49 and "The algorithm is invoked with some of the following parameters: ... maximum end to end transit delay ... The algorithm uses in the source node (or access node) a local copy of the network topology to determine the minimum hop and path length to the destination node" recited col. 6 line 59 – col. 7 line 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Holender by adding the maximum end to end transit delay factor of Bertin into Holender's decision variables (noting especially Holender as cited above has already disclosed distinguishing delay from other classes such as loss) in order to provide a faster and more efficient optimization method which "has the

advantage to considerably reduce the computation time required for the path selection" as pointed by Bertin (Abstract lines 12-13).

3. Claims 2-7,13,15-18, and 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holender et al (US 6,069894, Holender hereinafter) in view of Bertin et al (US 5,600,638, Bertin hereinafter), as applied above to claim 1, and further in view of Tate et al (US 5,933,607, Tate hereinafter).

Holender in view of Bertin describes the claimed limitations as discussed above in paragraph 2. And further:

Holender discloses the following features:

Regarding claim 13, *one or more computer storage media having computer-executable instructions for performing the method recited in claim 7* (fig. 1 "Operating Support System" with "Database" and "Control Programs", and see further "the method according to the first preferred embodiment of the invention is preferably performed by on or more control programs CP of the control program module of the operation and support system OSS" recited col. 14 lines 13-16).

Bertin discloses the following features that Holender does not disclose:

Regarding claims 3, 5, 7,16,18,24,26,28, *correlating* or *correlates the mapping options with the maximum time delay to identify optimal mapping of logical links to the physical topology of a network* (see "One advantage of the path selection technique of this invention is that a maximum path length constraint can be imposed on the path selection process" recited col. 6 lines 47-49 and "The algorithm is invoked with some of the following parameters: ... maximum end to end transit delay ... The algorithm uses in

the source node (or access node) a local copy of the network topology to determine the minimum hop and path length to the destination node" recited col. 6 line 59 – col. 7 line 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Holender by adding the maximum end to end transit delay factor of Bertin into Holender's decision variables (noting especially Holender as cited above has already disclosed distinguishing delay from other classes such as loss) in order to provide a faster and more efficient optimization method which "has the advantage to considerably reduce the computation time required for the path selection" as pointed by Bertin (Abstract lines 12-13).

Holender in view of Bertin does not disclose the following features:

Regarding claims 2/15/23, *the method/computer system/system of claim 1/14/22,* further comprising obtaining *a relative time delay allowed between two or more physical paths*.

Regarding claims 3/16/24, *the method/computer system/system of claim 2/15/23,* ... correlating/correlates/correlating the mapping options with the maximum time delay *and the relative time delay* to identify optimal mapping of logical links to the physical topology of a network.

Regarding claims 4/17/25, *the method/computer system/system of claim 3/16/24,* further comprising obtaining *the availability of wavelengths in a network*.

Regarding claims 5/18/26, *the method/computer system/system of claim 4/17/25,* further comprising correlating/correlates/correlating the mapping options with

the maximum time delay, *the relative time delay and the wavelength availability* to identify optimal mapping of logical links to the physical topology of a network.

Regarding claims 6/27, *the method/computer system/system of claim 5/26,* further comprising obtaining *a priority order of the network node pairs*.

Regarding claims 7/28, *the method/computer system/system of claim 6/27,* further comprising correlating the mapping options with the maximum time delay, *the relative time delay, the wavelength availability and the priority order of the network node pairs* to identify optimal mapping of logical links to the physical topology of a network.

Tate discloses a "digital communication system for simultaneous transmission of data from constant and variable rate sources" (col. 1 lines 1-4) using "user data logical channel addressing" (col. 32 line 26) with an ATM network interface that "provides for the physical and electrical connection to the B-ISDN or ATM LAN" (col. 55 lines 19-20) as shown in "a plan view of the topology 1" (fig. 1 and col. 8 line 57) comprising the following features.

Regarding claims 2/15/23, *obtaining a relative time delay allowed between two or more physical paths*.

Regarding claims 3/16/24, *the method/computer system/system of claim 2/15/23*, ...correlating/correlates/correlating the mapping options with the maximum time delay *and the relative time delay* to identify optimal mapping of logical links to the physical topology of a network.

(see Tate's consideration of "the bit streams can emerge from a second system interface with a relative delay between separate streams" recited col. 2 lines 1-3).

Regarding claims 4/17/25, *the method/computer system/system of claim 3/16/24,* further comprising obtaining *the availability of wavelengths in a network.*

Regarding claims 5/18/26, *the method/computer system/system of claim 4/17/25,* further comprising correlating/correlates/correlating the mapping options with the maximum time delay, *the relative time delay and the wavelength availability* to identify optimal mapping of logical links to the physical topology of a network.

(See above for Tate's disclosure of considering *the relative time delay* and further see, for considering *availability of wavelengths*, "an aggregated group may be formed out of the group of available channels" recited col. 47 lines 32-33).

Regarding claims 6/27, *the method/computer system/system of claim 5/18/26,* further comprising obtaining *a priority order of the network node pairs.*

Regarding claims 7/28, *the method/computer system/system of claim 6/19/27,* further comprising correlating/correlates/correlating the mapping options with the maximum time delay, *the relative time delay, the wavelength availability and the priority order of the network node pairs* to identify optimal mapping of logical links to the physical topology of a network.

(See above for Tate's disclosure of considering *the relative time delay and the wavelength availability* and further see, for considering *priority order of the network node pairs,* "Access to the system is provided in accordance with a ranking of priority. Higher priority nodes gain access in precedence to lower priority nodes" recited col. 3 lines 28-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method/system of Holender by including Tate's consideration of relative delay between different data stream, available channels and nodes priority into Holender's decision variables in order to provide a more versatile and robust network optimization mechanism that would "enable the direct connection of ATM terminals such as those that might be produced as a result of the work of CCITT and the ATM Forum and the following 'network connection' features: PSTN, ISDM, QPSX via third party LAN bridges and the following 'network connection capability: Broad Band ISDN..." as pointed out by Tate (col. 8 lines 23-31).

4. Claims 8/19 and 10/21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holender et al (US 6,069894, Holender hereinafter) in view of Bertin et al (US 5,600,638, Bertin hereinafter) and Tate et al (US 5,933,607, Tate hereinafter), as applied above to claims 7 and 18, and furthermore in view of Modiano et al ("Survivable Routing of Logical Topologies in WDM Networks", IEEE INFOCOM 2001, p. 348-357, Modiano hereinafter)

Holender in view of Bertin and Tate describes the claimed limitations as discussed above in paragraph 3. Holender further discloses the following features:

Regarding claims 8/19, *wherein the correlation is performed using a* control *program* (see "the method according to the first preferred embodiment of the invention is preferably performed by on or more control programs CP of the control program module of the operation and support system OSS" recited col. 14 lines 13-16).

Regarding claims 10/21, *wherein the correlation is performed to identify the optimal mapping for a large Internet network backbone* (see "a physical network, e.g. a large telecommunication network, with physical resources is considered" recited col. 6 lines 11-12).

Holender in view of Bertin and Tate does not disclose for **claims 8/19** that said control program is *an integer linear* program.

Modiano discloses method that "deals with the problem of routing logical links (lightpaths) on a physical network topology in such a way that the logical topology remains connected in the event of single physical link failure" (p 348 "I. Introduction" section lines 1-4) comprising the following features:

Regarding claim 8/19, *wherein the correlation is performed using an integer linear program* (see section "III. Integer Linear Programming formulation" and further "formulate the problem of survivable routing of a logical topology on a given physical topology as an Integer Linear Program (ILP)" recited said section lines 1-3).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the control program of Holender by adding the *linear integer program* approach of Modiano into Holender in order to provide a better mechanism of large network optimization for routing that "offers a much greater degree of protection than alternative routing schemes such as shortest path routing and a greedy routing algorithm", as pointed out by Modiano (Abstract last three lines).

5. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holender et al (US 6,069894, Holender hereinafter) in view of Bertin et al (US

5,600,638, Bertin hereinafter) and Tate et al (US 5,933,607, Tate hereinafter), as applied above to claims 7 and 18, and furthermore in view of Nucci et al ("Design of Fault-Tolerant Logical Topologies in Wavelength-Routed Optical IP Networks", GLOBECOM 2001, p. 1-6, Nucci hereinafter).

Holender in view of Bertin and Tate describes the claimed limitations as discussed above in paragraph 3. Holender further discloses the following features for **claims 9 and 20**, *wherein the correlation is performed using a* control program (see "the method according to the first preferred embodiment of the invention is preferably performed by on or more control programs CP of the control program module of the operation and support system OSS" recited col. 14 lines 13-16).

Holender in view of Bertin and Tate however does not disclose for **claims 9/20** that said control program comprises *a Tabu search methodology*.

Rucci discloses "a new methodology for the design of fault-tolerant logical topologies in wavelength-routed optical networks" (Abstract lines 1-2) comprising the feature for **claims 9/20** of:

wherein the correlation is performed using a Tabu search methodology (see Section IV on page 3 subsection "A. General description of Tabu Search metahiuristic" and further the texts immediately following the subsection title "The heuristic we propose to use in the solution of SLTDP [survivable logic topology design problem] relies on the application of the Tabu Search (TS) methodology" recited lines 1-2 therein)

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method/system of Holender by adopting, as an

alternative, an Tabu Search methodology of Rucci into Holender in order to provide a more reliable network routing mechanism that "relies on the dynamic capabilities of IP routing to –re-route datagrams when faults occurs, thus leading to high-performance cost-effective fault-tolerant logical topologies" recited Abstract lines 4-7).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holender et al (US 6,069894, Holender hereinafter) in view of Bertin et al (US 5,600,638, Bertin hereinafter) and Tate et al (US 5,933,607, Tate hereinafter), as applied above to claim 7, and furthermore in view of Jurkerich et at (US 5,164,938 hereinafter)

Holender in view of Bertin and Tate describes the claimed limitations as discussed above in paragraph 3. Holender in view of Bertin and Tate does not disclose the following features for **claim 11**: *wherein the correlation is utilized to identify where new fibers or wavelengths need to be added to the network topology.*

Jurkevich discloses a mechanism for "bandwidth seizing in integrated services networks" (col. 1 lines 2-3) wherein "a plurality of VCs [virtual circuits or logical connections] which share a single source-designation EFPS [fast packet node switch] pair may be routed (actually, multiplexed) by defining and end-to-end network path for them" (col. 10 lines 10-13) comprising the feature for **claim 11**: *wherein the correlation is utilized to identify where new fibers or wavelengths need to be added to the network topology* (see "...the node and its associated links are experiencing severe traffic congestion. Hence, flow control is urgently required. The situation may have arisen from the need to add a new channel (and thus a need for additional bandwidth), as indicated

in an FRR [frame reconfiguration request] received at the node, which triggers BW [band-width] seizing" recited col. 37 lines 36-41).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method/system of Holender by adding the mechanism of indication of need to add a new channel to Holender in order to provide a more robust mechanism enabling "for selectively reconfiguring composite data frames in and integrated services network as necessary for optimum bandwidth utilization, traffic flow and throughput performance" as pointed out by Jurkevich (col. 7 lines 23-26).

Response to Arguments

7. Applicant's arguments with respect all claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 5,764,740 provides a system and method for optimal logical network capacity dimensioning with broadband traffic using an network entropy-based dimensioning algorithm.

US 6,577,601 provides distributed approach for determining a parth conneting adjacent network nodes.

US 2002/0097671 discloses a method for selecting a restoration path in a mesh telecommunication network that would minimize transmission cost metric while maintaining required size of logical connections.

US 5,590,356 discloses a mesh parallel computer architecture considering maximum delay from transmission to reception for interprocessor connectivity.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Lai whose telephone number is 571-272-9741. The examiner can normally be reached on M-F 7:30-5:00 EST, Off alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Yao can be reached on 571-272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KWANG BIN YAO
SUPERVISORY PATENT EXAMINER

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